Reactivation of inherited oblique continental margin structures during the development of the south-central Taiwan fold and thrust belt

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The Taiwan orogen is forming due to the oblique collision between the Eurasian continental margin and the Luzon Arc. This configuration provides an opportunity to study the effect of inherited structures on the development of a fold and thrust belt (FTB). During the extensional tectonic history of the margin several NE trending basins filled with Eocene to Early Oligocene sediments developed on a pre-Cenozoic basement, and further extension took place on the outer margin during the Middle to Late Miocene. The margin transition from the platform to the slope, and the large-scale extensional features of the margin project obliquely onland across south-central Taiwan. These basins are now involved in the Taiwan FTB.

In this study we combine surface geology and balanced cross sections with Vp tomography, seismicity and focal mechanisms from the south-central FTB. We use a Vp of 5.2 km/s as a proxy for the basement-cover interface. We found that the FTB includes significant along strike changes in structure and stratigraphy that may be correlated with reactivating basement structures that are at a high angle to the structural grain. Seismic tomography and seismicity are used to trace structures from the continental margin offshore western Taiwan into the FTB. Major N to S changes in seismic velocities are interpreted as basement highs and lows and these correlate with areas were changes in the structural grain of the FTB take place, including some localized variation in the strike of thrusts and folds that are evident on the map. Several seismicity clusters align along the borders of these basement blocks. Focal mechanisms show mostly strike-slip kinematics in the foreland and thrusting in the FTB. In the FTB weak clustering of strike-slip are also present. The foreland seismicity is interpreted as the result of strike-slip reactivation of inherited extensional basement faults.